ASTRONOMICAL OBSERVATIONS IN 1910.

Made by TORVALD KÖHL, at Odder, Denmark.

VARIABLE STARS.

(The instrument used is a 3-inch Steinheil, power 42.)

S *Ursæ Majoris.*[1]

Jan.	4:	S = d.
	10:	1 step > d.
	19:	2 steps < d.
	30:	4 steps < e.
Feb.	8:	3 steps > f.
	16:	1 step > g.
	28:	id.
Mar.	2:	= g.
	5:	1 step > g.
	18:	1 step < g.
	26:	id.
	28:	id.
	31:	id.
Apr.	1:	= h.
	3:	id.
	28:	> g. < f.
May	5:	= f′.
	12:	2 steps < e.
	25:	= d.
July	13:	3 steps > d.
	24:	half way between d and c.
Aug.	11:	3 steps > d.
	14:	4 steps > d.
	16:	id.
	23:	2 steps > d.
	27:	< d. > e.
Sept.	3:	id.
	7:	1 step < e.
	12:	3 steps > f′.
	16:	id.
	20:	id.
	24:	= f.
	25:	id.
	28:	2 steps < f.
	30:	< f. > g.
Oct.	1:	id:
	4:	= g.
	8:	id.
	11:	id.
	13:	id.
	30:	2 steps < g.
Nov.	1:	id.
	26:	almost invisible.
Dec.	2:	1 step < g.
	18:	1 step > f′.
	20:	id.
	24:	3 steps < e.
	27:	id.
	30:	id.

T *Ursæ Majoris.*[2]

Jan.	4:	T = c.
	10:	id.
	19:	1 step < b.
	30:	3 steps > a.
Feb.	8:	id.
	16:	id.
	28:	id.
Mar.	2:	2 steps > a.

[1] Vide the sketch in the *Publications A. S. P.*, No. 73, **12**, 56.

[2] Vide the sketch in the *Publications A. S. P.*, No. 22, **4**, 63.

Mar.	18:	2 steps > b.
	26:	< b. or > c.
	28:	= c.
	31:	1 step < c.
Apr.	1:	< c. or > d.
	3:	= d.
	28:	< e. or > f.
May	5:	= f.
	12:	< f.
	25:	invisible.
July	13:	id.
	24:	id.
Aug.	11:	id.
	14:	id.
	16:	id.
	23:	id.
	24:	very faint.
	27:	id.
Sept.	3:	= f.
	7:	id.
	12:	= e.
	16:	< d. or > e.
Sept.	20:	= d.
	24:	< c. or > d.
	25:	= c.
	28:	< b. or > c.
	30:	id.
Oct.	1:	= b.
	4:	half way between a and b.
	8:	= a.
	11:	1 step > b.
	13:	= a.
	15:	< a. or > b.
	30:	id.
Nov.	1:	= b.
	4:	id.
	12:	½ step < b.
	26:	2 steps > c.
Dec.	2:	½ step < c.
	18:	2 steps < d.
	20:	1 step < d.
	24:	1 step > e.
	27:	2 steps > e.
	30:	= e.

The Stars f and g by T *Ursæ Majoris.*

The two little stars of about ninth to tenth magnitude in the sketch of T *Ursæ Majoris* are doubtless undergoing some small variations, and therefore are not suitable as comparison stars, I have noted:—

Apr.	28:	g = f.
May	5:	id.
Aug.	16:	g 2 steps > f.
	23:	g = f.
	24:	id.
	27:	id.
Sept.	7:	id.
	12:	id.
	16:	g 2 steps > f.
	24:	id.
	25:	g = f.
Sept.	30:	g 1 step > f.
Oct.	4:	id.
	11:	id.
Nov.	1:	g 1 step < f.
	4:	g 1 step > f.
Dec.	18:	g 2 steps > f.
	20:	g = f.
	24:	id.
	27:	g 1 step > f.
	30:	g 1 step < f.

W *Pegasi.*[1]

Jan.	4:	W 2 steps > e.
	10:	id.
	19:	1 step > e.
	30:	= f.
Feb.	8:	id.
	16:	2 steps < f.
Mar.	5:	< f. > g.
July	13:	= e.
	24:	id.
Aug.	11:	< d. > e.
	16:	1 step < d.
	23:	= d.
	27:	> d. < c.
Sept.	3:	= c.
	7:	3 steps > c.
	12:	id.
	24:	= b.
	28:	id.
	30:	2 steps > b.
Oct.	1:	id.
	4:	1 step > b.
	8:	= b.
	11:	id.
	13:	1 step > b.
	15:	2 steps > b.
	30:	3 steps < b.
Nov.	3:	4 steps < b.
	12:	3 steps > c.
	26:	4 steps < c.
Dec.	2:	1 step < c.
	18:	= e.
	20:	1 step < e.
	24:	3 steps < e.
	27:	1 step < e.
	30:	= f.

SS *Cygni.*[2]

Jan.	4, 6h:	SS < f. > g.
	10, 7h:	id.
	19, 7h:	= f.
	30, 8h:	< c. > d.
Feb.	8, 8h:	2 steps < f.
	16, 9h:	invisible, ☾
Mar.	31, 11h:	invisible
Apr.	9, 10h:	1 step < f.
	16, 11h:	= c.
	27, 14h:	> f. < e.
May	1, 15h:	2 steps < f.
	4, 14h:	= g.
	12, 12h:	id.
	25, 11h:	= c.
July	13, 11h:	= f.
	24, 11h:	1 step > f.
Aug.	16, 10h:	> e. < d.
	23, 9h:	1 step < g.
	24, 9h:	= g.
Sept.	3, 11h:	1 step > f.
	7, 11h:	= g.
	25, 9h:	id.
	28, 11h:	< g.
	30, 9h:	= g.
Oct.	4, 8h:	1 step > f.
	8, 10h:	= e.
	13, 9h:	id.
	30, 6h:	id.
Nov.	1, 10h:	> g. < f.
	3, 8h:	= f.
	26, 9h:	invisible.
Dec.	2, 5h:	= g.
	18, 6h:	< c (nearest c) > d (nearest c)
	20, 6h:	< c. > d.
	24, 6h:	half way between f and g.
	27, 7h:	= g.
	30, 8h:	1 step < g.

N. B.—c is situated between SS and g; the last star is not contained in the sketch.

[1] Vide the sketch in the *Publications A. S. P.*, No. 60, **10**, 23.

[2] Vide the sketch in the *Publications A. S. P.*, No. 100, **17**, 18.

Z *Cygni*.[1]

Jan.	4:	Z invisible.	Aug.	24:	id.
	19:	id.	Sept.	3:	4 steps < e.
	30:	= c.		7:	id.
Feb.	8:	2 steps < b.		25:	= e.
Mar.	5:	< a. / > b.		28:	> d. / < c.
	18:	2 steps > b.		30:	1 step < c.
	28:	= b.	Oct.	4:	= c.
	31:	id.		8:	id.
Apr.	7:	< b. / > c.		11:	1 step > c.
	9:	id.		13:	= c.
	16:	< c. / > d.		30:	= b′.
	28:	= d.	Nov.	26:	2 steps < a.
May	2:	< d. / > e.	Dec.	2:	= a.
	5:	id.		20:	1 step > b′.
	12:	2 steps > e.		24:	< a. / > b′.
	25:	invisible.		27:	=b′.
				30:	< b. / >c.

U *Herculis*.

Apr.	28:	U invisible.	Oct.	4:	= f.
May	5:	id.		8:	half way between d and e.
	12:	much < h.		13:	1 step > d.
July	24:	invisible.		15:	> d. / < c.
Aug.	14:	id.	Nov.	3:	1 step < b.
	23:	2 steps < h.		12:	= a.
	27:	4 steps < h.	Dec.	2:	2 steps > c.
Sept.	3:	2 steps < h.		18:	< c. / > d.
	7:	id.		30:	1 step > d.
	16:	> h. / < g.			
	25:	half way between f and g.			

N. B.—I have used the sketch in the *Publications A. S. P.*, No. 106, **18**, 52, but have added the two small neighboring stars g at a and h at f, both northward.

Y *Tauri* (B. D. + 20° 1083).

Several comparisons have been made upon this irregular variable star. As in the year 1908 Y was noted either equal to or brighter than the star A = B. D. + 20° 1095 ($7^m.4$). On

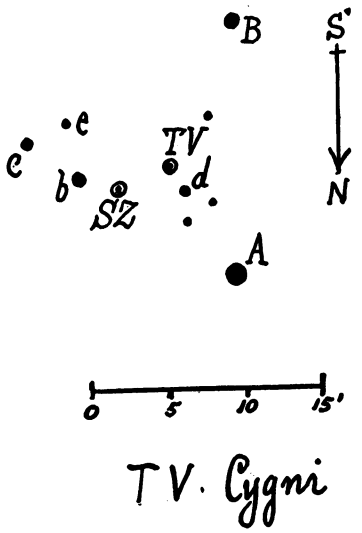
[1] Vide the sketch in the *Publications A. S. P.*, No. 100, **17**, 16.

January 30th, February 28th, and October 30th it was estimated 2 steps > A, but on several other dates it was only estimated = A.

TV *Cygni.*[1]

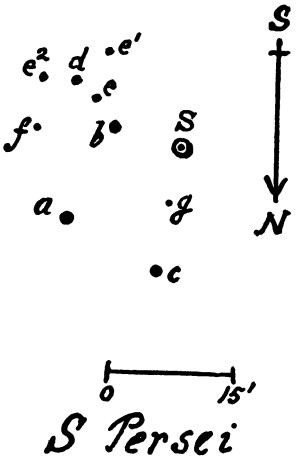
Jan. 30:	b > TV = c.
Apr. 28:	b > TV > c.
May 2:	id.
12:	id.
Sept. 7:	id.
Oct. 13:	b > c > TV > d.
Dec. 24:	id.

N. B.—In the sketch A means B. D. + 46° 2977 and B = B. D. + 45° 3217.



S *Persei.*

Mar. 5:	S = g.
18:	1 step > g.
27:	id.
31:	id.
Apr. 3:	2 steps > g.
9:	= f.
16	< f. / > g.
28:	id.
May 5:	> f. / < e.
July 24:	= d.
Aug. 11:	1 step > d.
23:	1 step < d.
27:	id.
Sept. 3:	= d.
7:	= b.
12:	= d.
20:	2 steps > d.
28:	1 step < c.
30:	= c.
Oct. 4:	= a.
8:	id.
30:	2 steps > a.
Nov. 4:	1 step > a.
10:	2 steps > a.
Dec. 2:	= a.
18:	= b.
20:	1 step > a.
27:	id.



[1] Vide the *Publications A. S. P.*, No. 77, **13**, 18.

METEORS.

Fireballs have been observed from stations in Denmark on the following dates: January 21st, March 30th, April 9th, 11th, May 1st, 8th, 22d, 23d, June 8th, 12th, July 2d, 4th, 9th, August 3d, September 2d, 4th, 12th, 24th, October 4th, 30th, November 1st, 4th, 5th, December 25th, 27th.

The fireball on October 4th was also "observed" by a little dog in Copenhagen. The frightened animal stood quite immovable, grumbling at the curious thing above in the sky. On October 30th fireballs were seen at 9^h, $11^h\ 28^m.5$ and $11^h\ 50^m$ P.M.

SHOOTING-STARS.

Shooting-stars were observed from nine stations in Denmark on August 9th, 10th, and 11th. At these stations 155 paths of shooting stars were mapped, and a number of eighteen proved suitable for calculation, under which two interesting fireballs were taken up: the meteor on April 11th, which was photographed at Potsdam in Germany and visually observed at Tyderup in Denmark, and the meteor on October 30th, $11^h\ 28^m.5$ P. M. These eighteen meteors have given the following results:

From Observation.

No.	Time, P. M.	Station.	Beginning.	Ending.	Mag.	Observer.
1	Apr. 11, $9^h\ 47^m\ 32^s$	Tyderup	.....	170° — 24°	1	M. POVLSEN
		Potsdam	.....	128 + 21.5	2	Prof. HERTZSPRUNG
2	Aug. 9, 11 11 40	Kolding	.....	333 + 6	2	H. NIELSEN
		Odder	.....	307 — 9	1	L. DOLLERIS
3	Aug. 9, 11 15 49	Kolding	20° + 37°	10 + 28	1	H. NIELSEN
		Odder	0 + 34	352 + 22	1	L. DOLLERIS
4	Aug. 10, 10 4 5	Hjerpsted	42 + 47.5	35 + 40	2	N. H. BOSSEN
		Copenhagen	170 + 68	188 + 63	3	LAU and KIERULFF
5	Aug. 10, 10 6 33	Kolding	20 + 37	14 + 30	3	H. NIELSEN
		Copenhagen	10 + 80	261 + 74	3	LAU and KIERULFF
6	Aug. 10, 10 19 27	Hjerpsted	39 + 47	30 + 42	3	N. H. BOSSEN
		Kolding	26 + 56	18 + 47	2	H. NIELSEN
7	Aug. 10, 10 43 46	Kolding	.....	355 + 31	2	H. NIELSEN
		Faxe	.....	234 + 52	1	J. SKAKKE
8	Aug. 10, 10 48 58	Kolding	.....	346 — 2	1	H. NIELSEN
		Odder	.....	334 — 8	2	L. DOLLERIS
9	Aug. 10, 11 9 22	Kolding	.....	29 + 25	2	H. NIELSEN
		Odder	.....	14 + 22	3	ODDER
		Copenhagen	.....	335 + 69	3.5	LAU and KIERULFF
10	Aug. 10, 11 17 50	Kolding	.....	308 + 25	1	H. NIELSEN
		Faxe	.....	240 + 21	1	J. SKAKKE

From Observation (Continued).

No.	Time, P. M.	Station.	Beginning.	Ending.	Mag.	Observer.
11	Aug. 10, 11 31 48	Odder	4 + 8	14 + 13	2	L. Dolleris
		Faxe	355 + 50	30 + 60	1	J. Skakke
12	Aug. 10, 11 43 52	Odder	..... .	45 + 18	1	L. Dolleris
		Copenhagen	.....	79 + 51.5	..	Lau and Kierulff
13	Aug. 10, 11 49 52	Kolding	305 + 0	297 — 15	1	H. Nielsen
		Faxe	270 + 4	266 — 9	..	J. Skakke
14	Aug. 10, 11 58 29	Kolding	.....	295 + 7	1	H. Nielsen
		Faxe	.....	253 + 8	1	J. Skakke
15	Aug. 11, 10 50	Odense	.....	312 + 16	..	S. Carstens
		Faxe	.....	216 + 10	1	J. Skakke
16	Aug. 11, 11 49 5	Odder	34 + 28	36 + 23	2	L. Dolleris
		Faxe	64 + 58.5	78 + 57	1	J. Skakke
17	Aug. 11, 11 51 36	Odder	.....	80 + 72.5	1	L. Dolleris
		Faxe	.....	178 + 53	2	J. Skakke
18	Oct. 30, 11 28 30	Vraabg	.....	50 + 30	..	E. Hansen
		Copenhagen	.....	34 + 15	..	Aage Fock

From Calculation.

No.	Beginning.			Ending.			Real length of the path.	Radiant.	
	h	λ	φ	h	λ	φ	β	AR	Decl.
1	....	.....	.....	88.0	0° 25′.6 w	51° 59′.7	...	.....	
2	....	.....	.....	59.2	2 11 .7 w	54 53 .0	...	.....	
3	128.0	0° 25′.8 w	55° 53′.0	126.3	0 15 .6 w	55 28 .3	47.8	140°	+ 34°
4	129.8	1 5 .7 w	56 48 .5	98.3	0 59 .4 w	56 22 .6	58.6	122	+ 65
5	129.7	0 22 .6 e	56 25 .9	90.8	0 15 .1 w	55 58 .4	76.3	45	+ 54
6	101.3	1 43 .2 w	56 14 .2	125.2	0 51 .9 w	56 13 .9	59.3	185	÷ 20
7	....	.....	.....	93.6	1 26 .5 w	55 25 .3	...	.....	
8	....	.....	.....	100.5	0 16 .9 e	54 3 .6	...	.....	
9 A	....	.....	.....	89.3	0 11 .3 e	55 55 .1	...	.....	
B	....	.....	.....	87.8	0 13 .1 e	55 54 .7	...	.....	
C	....	.....	.....	89.3	0 13 .5 e	55 55 .1	...	.....	
10	....	.....	.....	102.3	2 56 .6 w	54 58 .2	...	.....	
11	89.1	0 17 .6 e	55 15 .7	81.7	0 24 .6 e	55 36 .8	40.6	298	÷ 24
12	....	.....	.....	46.4	0 46 .9 e	56 23 .7	...	.....	

From Calculation (Continued).

No.	Beginning.			Ending.			Real length of the path.	Radiant.	
	h	λ	φ	h	λ	φ	β	AR	Decl.
13	145.1	3 0.9 w	53 41.4	92.8	3 34.7 w	53 14.6	61.5	54	+ 50
14	....	.....	.....	100.7	3 49.3 w	54 29.4	...	.....	
15	....	.....	.....	25.6	2 3.5 w	55 12.3	...	.....	
16	119.2	1 4.8 e	56 16.8	80.4	0 39.5 e	56 10.2	48.7	21	+ 53
17	....	.....	.....	92.5	1 54.8 w	56 46.6	...	.....	
18	....	.....	.....	99.4	0 11.0 e	54 56.4	...	.....	

h and β are expressed in kilometers; λ is longitude from Copenhagen; φ is north latitude; h is the altitude of the meteor above the Earth's surface. The combination of Kolding-Odder is marked A, Kolding-Copenhagen B, and Odder-Copenhagen C.

From August 8th to 13th, inclusive, astronomical lectures were held at the Carina Observatory in Odder, and thereupon the observatory was opened for visitors on every fine evening from 9 to 10 o'clock until October. In the estimations of variable stars I often have been assisted by Mr. J. SKAKKE.